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RESEARCH ARTICLE

ASSESSMENT OF THINNESS AMONG SCHOOL GOING ADOLESCENTS USING NEW BODY MASS INDEX CUT-OFF POINTS

Keya Ghosh^{1,2}, Soumyajit Maiti^{2,3}, Debidas Ghosh^{2,3} and Shyamapada Paul^{2*}

¹North City Hospital & Neuro Institute Pvt. Ltd. 73, Bagmari Road, Kolkata-700 054, West Bengal, India

²Rural Research Institute of Physiology & Applied Nutrition (RRIPAN), 'Gitanjali', Dr.Nilay Paul Road, Midnapore-721101, West Bengal, India

³Department of Bio-Medical Laboratory Science and Management, (U.G.C Innovative Department), Vidyasagar University, Midnapore-721 102, West Bengal, India

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ABSTRACT

The present study was undertaken to determine the level of thinness using body mass index (BMI) among school going adolescent (11-16 years) of peri-urban area of West Bengal. Height and weight measurements were taken from 385 subjects (207 boys and 178 girls). BMI was computed by standard formula. Age and sex specific cut-off values of BMI were used to identify thinness. The overall (age-combined) mean BMI among boys and girls were 16.16 and 16.41 respectively. There were no significant sex differences in mean BMI at any age. The overall (age-combined) prevalence of thinness among boys and girls were 60.3 % and 64.0%, respectively. The result of the present study clearly indicates that the nutritional status of these adolescents was serious. Therefore, sustained efforts are needed to ameliorate the nutritional status of this age group.

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INTRODUCTION

Adolescence is a period of transition between childhood and adulthood is a significant period of human growth and maturation (WHO, 1995). This age group needs special attention because of the turmoil of adolescence which they face due to the different stages of development that they undergo, different circumstances that they come across, their different needs and diverse problems (Hanson and Gluckman, 2006). During adolescent, health and nutritional status is an important indicator of the national public health importance in the development of its future manpower but often received scant attention (Goyal and Chavan, 1993). In this concern, a school setting provides an ideal platform to detect the health problems early and treat them. Generally, childhood under-nutrition is assessed by stunting (low height-for-age), underweight (low weight-for-age) or wasting (low weight-for-height) following different internationally and regionally recommended standards. Body mass index (BMI) is an inexpensive and non-invasive measure that has been extensively utilized to assess the nutritional status of adults and thinness in adolescents (WHO, 1995). Very recently, international cut-off for thinness has been developed and classification of thinness is made on the basis of cut-off values for the assessment of public health. However, the prevalence of thinness among school going adolescent was

not investigated adequately in West Bengal. The aim of the present study was to evaluate different grades of thinness using age and sex specific international cut-off values based on BMI.

MATERIALS AND METHODS

Subjects

Data for the present study was collected from a secondary school, situated in a peri-urban area of North 24 Parganas district, West Bengal. The study area is located approximately 17 km from the centre of Kolkata, the provincial capital. The sample size consisted of 385 (207 boys and 178 girls) adolescent aged 11-16 years. The majority of the students were of hindi-speaking migrant population (68.4%) and Bengalee Muslim (30.2%) ethnicity. Age of the subjects was ascertained from the school registers. Ethical approval was obtained from school authorities prior to the commencement of the study.

Anthropometric assessment

Height and weight measurements were taken on each subject following the standard techniques (Lohman *et al.*, 1988). These were recorded with the subject wearing minimal clothing, to the nearest 0.1 cm and 0.5 kg., respectively.

*Corresponding author: paul_shyamapada@rediffmail.com

Body mass index (BMI) was computed following internationally accepted standard equation as weight in kg divided by square of height in meter. The prevalence of thinness was assessed following the international BMI cut-off points proposed by Cole *et al.*, (2007). The BMI values were used to determine the definite grades of thinness (Grade-III: severe, Grade-II: moderate, Grade-I: mild).

Analysis

Between sexes differences in means of BMI was tested by students t-test (equal variances assumed). Proportion tests were undertaken to test for sex differences in overall thinness in each age group and age combined, respectively.

RESULTS

The mean BMI of the subjects is presented in table 1. The overall (age-combined) mean BMI among boys and girls were 16.16 (2.86) and 16.41(3.06), respectively. There was a consistent increasing trend in mean BMI with age. There was no significant sex difference in mean BMI at any of the ages. Table 2 presents the prevalence of thinness by age and sex among subjects. The extent of thinness was slightly higher in girls (64%) than the boys (60.3%). Overall (age combined), the frequency of grade-II thinness were almost similar in both sexes. Moreover, the proportion of normal children was slightly higher among boys (32.3%) than the girls (29.7%). Pervasiveness of grade I thinness was more prevalent followed by grade II and III among boys and girls.

al., 2010). The high prevalence of thinness is commonly reported from the developing world (Ghosh and Bandyopadhyay, 2009; Mondal and Sen, 2010; Maiti *et al.*, 2011). The new cut-off points were suggested to encourage direct comparison of trends in child and adolescent thinness worldwide. This paper highlights the extent of thinness among adolescent boys and girls of peri-urban area of West Bengal. It is apparent from this investigation that there is a very high prevalence of undernutrition among adolescents as the prevalence of thinness was found. In this study, the frequency of thinness was 60.3% and 64% in boys and girls, respectively. Similarly, high rate of thinness (62.9 % in boys and 61.6 % in girls) was reported among rural school children from Purba Medinipur district of West Bengal (Chakraborty and Bose, 2009). Another study from West Bengal documented a higher prevalence of thinness (71.11% among boys and 67.77% among girls), compared to the present study (Mondal and Sen, 2010). A recent study among early adolescent school girls observed that existence of thinness was 58.30% using same reference data (Maiti *et al.*, 2011). In other context, low prevalence of thinness (28.44% in boys and 16.90% in girls) has also been reported among urban adolescent using WHO ⁵th percentile reference (Ghosh and Bandyopadhyay, 2009). A noteworthy point was that the thinness was more prevalent among girls than the boys in our study. But several studies reported boys were affected more than girls (Chakraborty and Bose, 2009; Ghosh and Bandyopadhyay, 2009; Mandal and Sen, 2010). In spite of having some limitation such as low sample size and

Table 1: Mean and standard deviation of BMI of the subjects by age and sex

Age (Years)	Boys		Girls		t*
	n	BMI (kg/m ²)	n	BMI (kg/m ²)	
11	38	14.47±2.75	29	14.42±2.65	-0.54
12	41	14.82±2.27	39	15.73±2.14	-2.24
13	35	16.53±3.21	29	16.26±2.17	-0.19
14	26	17.11±1.9	31	17.44±3.46	-0.42
15	40	17.34±2.07	28	16.82±2.16	0.95
16	27	17.97±3.54	22	18.11±3.06	1.48
Total	207	16.16±2.86	178	16.41±3.06	-0.74

* Sex differences of BMI not significant at any age

Table 2: Prevalence of thinness by age and sex among the subjects

Age (Years)	Boys					Girls				
	Gd-III	Gd-II	Gd-I	Overall	Normal	Gd-III	Gd-II	Gd-I	Overall	Normal
11	9 (23.6)	6 (15.7)	6 (15.7)	21 (55.2)	12 (27.5)	8 (31.0)	5 (17.2)	8 (27.5)	21 (72.4)	6 (20.6)
12	11 (26.8)	8 (19.5)	11 (26.8)	30 (73.1)	9 (21.9)	6 (15.3)	7 (17.9)	10 (25.6)	23 (58.9)	13 (33.3)
13	6 (17.1)	5 (14.2)	7 (20)	18 (51.4)	15 (42.8)	7 (24.1)	5 (6.8)	7 (17.2)	19 (72.4)	8 (27.5)
14	4 (15.3)	2 (7.6)	8 (30.7)	14 (53.8)	10 (38.4)	8 (25.8)	5 (16.1)	7 (24.1)	20 (64.5)	9 (29.0)
15	8 (20)	6 (15)	11 (27.5)	25 (62.5)	13 (32.5)	5 (17.8)	4 (14.2)	9 (32.1)	18 (64.2)	9 (32.1)
16	5 (18.5)	7 (25.9)	5 (18.5)	17 (62.9)	8 (29.6)	4 (18.1)	4 (18.1)	5 (22.7)	13 (59.0)	8 (36.3)
All ages	43 (20.7)	34 (16.4)	48 (23.1)	125 (60.3)	67 (32.3)	38 (21.3)	30 (16.8)	46 (25.8)	114 (64.0)	53 (29.7)

Percentages are presented in parentheses

DISCUSSION

Undernutrition is documented public health problem contributing substantially to children's survival (Dambhare *et*

summarized that the adolescents in the present investigation are facing a great risk in terms of nutritional stress which is even more pronounced among girls. It is well documented that thinness is an indicator of acute under-nutrition which is

the results of more recent food deprivation (WHO, 1995). Adolescent health is an important issue and their needs have to be address properly. Therefore, there is a need to evolve integrated approaches and sustained efforts to improve nutritional status of this group.

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